SQUAM ROCK LAND TRUST TRAIL PLAN

Prepared for the

Squam Rock Land Trust

by William Giezentanner

Mass Audubon's Ecological Extension Service

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Mass Audubon

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Contents

Introduction

The Squam Rock Pasture in the Annisquam area of Gloucester is an almost thirteen-acre open space located at 20 Walnut Street.

This document aims to provide a plan for a more sustainable trail system for Squam Rock Pasture based on a trail assessment that was done as part of the Squam Rock Management and Restoration Plan completed in August 2023. The assessment of the site's existing trail system as well as the overall assessment its ecological resources; the impacts of unmanaged use; invasive species management; maintaining biodiversity; and effects of climate change, including sea-level rise and impacts from more frequent and intense storms are all factors that impact the use of the site and its trail sysstem. Every effort to manage land responsibly is important and benefits everyone. Being good stewards of the land is a responsibility, but more importantly it forms a relationship between the land and the stewards that nourishes both.

The Squam Rock Land Trust is fortunate to have more than 500 shareholders who join to enjoy a unique and beautiful site. The limited scale of the site and the dedication of the trustees and shareholders makes doing the work to implement an ecological restoration and stewardship plan much and this trail plan more feasible than the challenges facing many other conservation groups who often struggle to have the recourses to manage hundreds of acres.

Land Acknowledgement

Land that is well managed sustains us in many ways – often referred to as ecosystem services. A few examples of what land provides when it is managed sustainably include:

- The air we breathe,
- The water we drink,
- The food we eat,
- Sequestration of carbon,
- Climate moderation,
- Protection from flooding,
- Recreation that renews our spirits.
- Health benefits from being in nature,
- The lumber we use to build our shelters,
- Filtration and decomposition of our wastes, and
- Habitats for a diversity of plants and animals.

Squam Rock Pasture and the rest of Cape Ann are situated within the ancestral lands of the Native American families and tribes of the Pawtucket Confederation who lived in New England from around 3,000 years ago, descendants of Algonquian-speaking people who predated them, some dating back to Paleolithic times. Evidence of their presence can be found throughout Cape Ann. Ancient shell piles or

"middens" on the shores of the Essex River and the Annisquam River mark the sites of summer encampments visited over centuries[1].

These lands were taken from the Indigenous people, creating a legacy of trauma that persists to this day. Indigenous stewardship of the land kept its ecological communities vibrant, strong, and interconnected for thousands of years, but far from being relics of the past, Indigenous peoples, including 37,000 individuals who currently reside in Massachusetts, are still at the forefront of environmental protection, ecological stewardship, and climate mitigation. This land helped sustain them for thousands of years before its occupation by Europeans. How we care for the land will determine how well it will sustain us and our descendants.

Current Landscape

The former pasture has a diverse landscape consisting of cultural grassland (upland meadow), forested wetland, upland deciduous forest, small stands of evergreen trees, a coastal bank, a coastal beach, and scattered outcrops of granite, including Squam Rock, and glacially deposited boulders.

FIGURE 1 - USGS MAP OF ANNISQUAM AREA OF CAPE ANN. SQUAM ROCK PASTURE HIGHLIGHTED.

A network of trails crosses the site, some leading from Walnut Street to the beach. Like many private and public open spaces, much of the site has been infested with invasive species of plants.

[1] https://www.capeannmuseum.org/native-americans-cape-ann/

Trail Assessment

The trail assessment in Appendix A (page xx) evaluates the existing trail network, section by section. Problem areas are identified and alternatives for solving those problems have been presented for discussion. Based on that discussion each solution can be described in detail (i.e., width, linear feet of trail, materials, permitting requirements, and costs, etc.). The assessment of the trails at Squam Rock Pasture indicates many areas with problems including areas of erosion and trail widening to avoid steps and water bars. Most of these problems are the result of poor trail design and lack of maintenance.

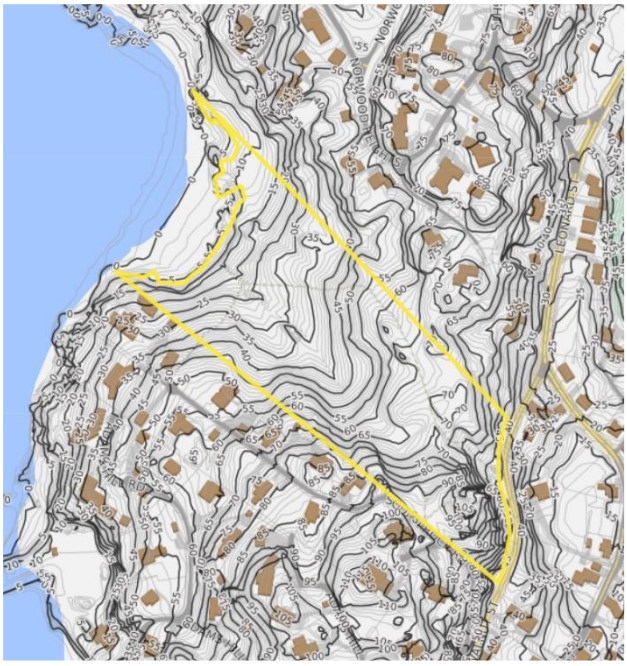


FIGURE 2 - TOPOGRAPHY - 5' CONTOURS

Topography

As shown in Figure 2, parts of Squam Rock Pasture have a steep, dramatic rise to 121 feet at the top of Squam Rock on its southeast corner along Walnut Street. A bit north along the street it rises more gently to 65 feet and then slopes down gently to sea level. Some steep areas present difficulty for locating trails.

Soils

Squam Rock Pasture has three soil types: Chatfield-Hollis rock outcrop complex, with slopes predominately between 15% and 35%; Winsor loamy sand, with slopes predominately between 8% and 15%; and Beach sand. The Chatfield-Hollis soil is on steep side slopes and is likely to have rock outcrops. It is shallow, well drained, and severely subject to erosion. The Winsor soil is generally deep, gently sloping, and excessively drained. It often includes a considerable amount of sand. Beach sands are limited to the shore area and coastal bank. **Locating or improving trails, especially on the Chatfield soils, needs to be done with care to avoid erosion.**

Regulated Areas

Some areas of Squam Rock Pasture are subject to local and state regulations including the Massachusetts Wetlands Protection Act (M.G.L. c. 131 §40) which covers wetlands, rivers, streams, ponds and their banks, floodplains, isolated land subject to flooding, buffer zones adjacent to these resources, and a 200-foot Riverfront buffer. See Figure 3.

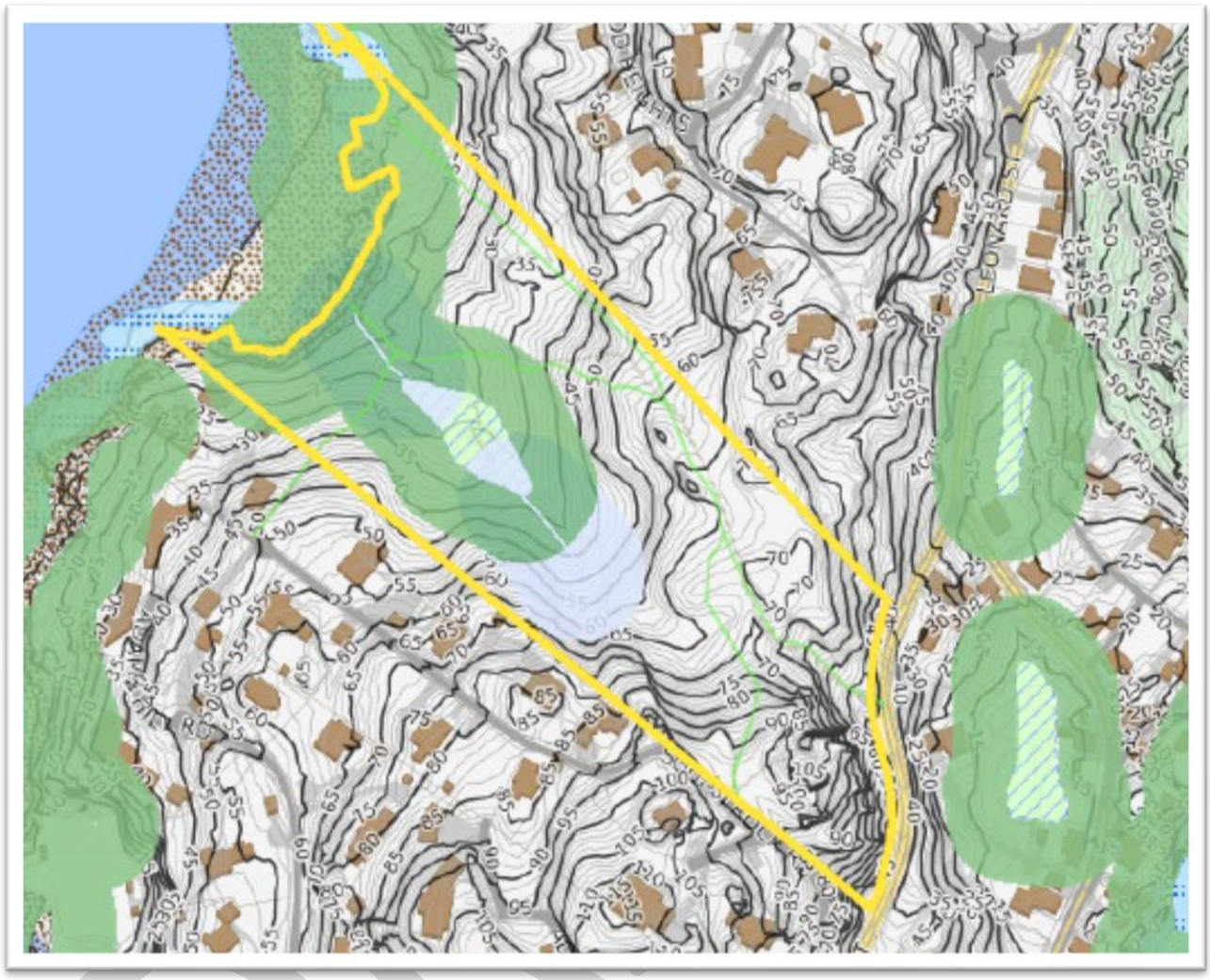


FIGURE 3 - REGULATED AREAS

A more accurate delineation of the wetlands and buffer areas was completed by DeRosa Environmental and is included in the appendix.

A site walk in June 2023 with The Gloucester Conservation Agent, Chuck Schade, and Assistant Conservation Agent, Devon Harrington, resulted in a recommendation that a Request for Determination of Applicability (RDA) should suffice for gaining permission for manual/mechanical control of invasive species and minor trail alterations to move some existing trails farther away from resource areas in the regulated areas. Note that Section 310 CMR 10.02(2)(b)2 allows the creation "Unpaved pedestrian walkways less than 30 inches wide for private use and less than three feet wide for public access on conservation property.

Trails

A well-designed, comfortable, and safe trail network facilitates enjoyment of an area and protects the conservation values of the site. The existing trail network is an integral part of the site's passive recreational value, providing shareholders with a means for exploring and enjoying the site. Trails

should be located to minimize redundancy and enhance the visitor experience by not exceeding the capacity of the site to accommodate trails. To the greatest extent possible, all trails should be located outside of sensitive natural resource areas, such as habitat for sensitive wildlife, steep slopes, or soils that are too wet or prone to erosion. Edward Hubbard, in his 1962 report on wildflowers noted erosion problems on several trails.

Sustainable Trails

Climate change is having a big impact on trails because of more intense weather events. Northeastern U.S. saw a 55% increase in the amount of rain or snow falling in the heaviest 1% of storms between 1958 and 2016. Some climate models project monthly precipitation between December and April will increase 1 inch by the end of this century. Both the Appalachian Mountain Club and the Long Trail Club have noted the impacts on trails of extreme weather events. Trail managers have noted more erosion, more frequent blowdowns, and more wet trail areas that stay wet longer. These factors can all have a big impact on the visitor experience and on maintenance.

The US Forest Service defines a sustainable trail as one that will:

- withstand the impacts of normal use and natural elements,
- cause negligible soil loss,
- encourage users to stay on the trail,
- not adversely affect area's natural or cultural resources, and
- require minimal maintenance.

Design, construction, and maintenance of the trail network should be guided by the standards and guidelines in *Trail Solutions: IMBA's Guide to Building Sweet Singletrack*[2] and the *U.S. Forest Service Trail Construction and Maintenance Notebook.* The particulars of trail design will vary based on site conditions and use. Nevertheless, the Trustees and volunteers should pursue the following principles in trail design.

Trail width – Major trails (like the trail from the entrance to the beach) should be 4 to 5 feet wide in areas of heavy use like access to beach and other favorite destinations so that shareholders can walk side by side or pass. Lesser used trails should be 3-4 feet wide to minimize impacts to natural resources and to encourage a closer experience with nature, with the expectation that some width expansion may be inevitable with use. Vegetation along the edge of the trail should be clipped back (weed whacked when necessary) 2 feet beyond the tread width to prevent an opportunity for ticks to attach to visitors. Selected trails through rapidly encroaching vegetation may need to be trimmed wider.

Trail Layout – many of the existing trails run perpendicular to the contours. These "fall line" trails almost guarantee erosion if they are more than 5% grade in the soils at this site. Trails should cross contours at an angle and have "out-slope" and "grade reversals" to move water off

[2] For an on-line version of much of the same information see http://www.crgov.com/DocumentCenter/View/1430/Sustainable-Trail-Development-Guidelines-PDF?bidId=

the trail treadway. "Trail anchors", and "corralling" should be used to help keep users on the trails. See Appendix D – Trail Assessment (page 46) for more information on existing trails and on design.

Trail surface – trails should normally retain a natural soil surface. Trails through grasslands will be maintained with periodic mowing and need not be cleared down to mineral soil. In rare circumstances where the existing substrate cannot be made into a sustainable surface, supplemental surfacing material may be used. Accessible trails, if any, should meet standards set by the *U.S. Forest Accessibility Guidelines Service*[3].

Travel off Official Trails

Travel off official trails should be minimized by clearly stating on all signs that visitors should remain on trails. In those areas where unofficial trails become apparent, large sticks and branches can be placed on the trail to indicate that travel is not allowed. Where needed, "*Area Closed*" or "*Ecological Restoration Area. Do Not Enter*" signs can be posted.

Property stewards should endeavor to understand the use of the site for geocaching or other informal activities that specifically involve leaving official trails. Stewards should engage these user groups to understand the use and make a recommendation to staff regarding potential impacts of off-trail use. If any such use is determined to have a specific impact on a known resource, action should be taken in cooperation with the specific user group to minimize impact, or if deemed necessary, to alter or discontinue this use.

Goals for the Rehabilitation and Stewardship of Squam Rock Pasture

At its 2022 Annual Meeting the Trustees presented the following principles for the future of Squam Rock Pasture.

- **HARMONY** between human enjoyment and ecological preservation
- **RESPECT** for the legacy of the Trust and shareholder interests
- **PHASED, THOUGHTFUL** approach that remains dynamic
- **PASSION** for nature and responsible stewardship
- **OPTIMISM** about sustaining a vibrant, ecologically healthy property
- **COMMUNITY** of leaders, volunteers and shareholders working together

They also presented an approach and priorities for moving forward with planning.

- **Restore undermined habitats** while sustaining responsible human use
- **Improve the resiliency and ecological health** of the property to safeguard it for future shareholder use
- **Increase biodiversity**- manage the property line with best ecological practices

[3] https://www.americantrails.org/images/documents/FSTAG_2013-Update_190413_201340.pdf

- Continue research and guidance from experts so that the best science informs the restoration process

The goals that were articulated include:

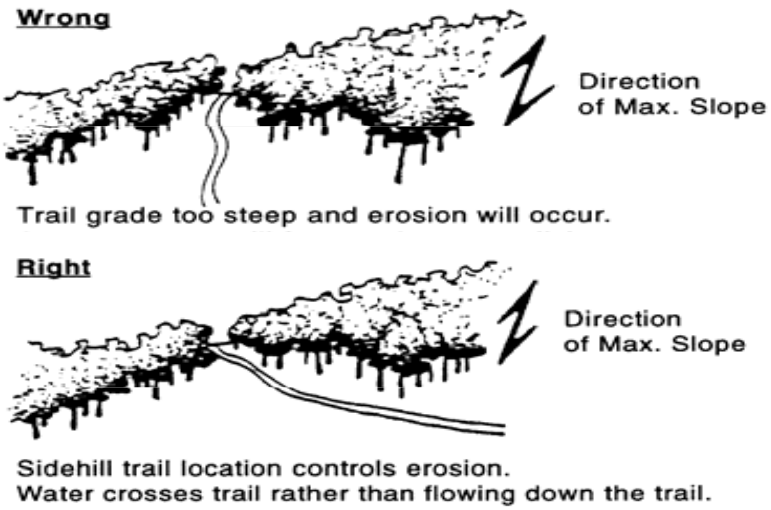
- **Improve the resiliency and ecological health of the property:** Restore and nurture rich biodiversity of the natural communities and prevent excess human use of environmentally sensitive areas to safeguard the property for present and future residents of Annisquam.
- **Create a simplified path system:** Reduce the number of paths and locate them in such a way as to prevent disturbance of protected areas, mitigate erosion of the soil and maintain ease of access.
- **Follow conservation best practices:** Ensure that all restoration and maintenance work, including but not limited to, removal of invasives and planting of native species is guided by updated environmental science expertise.
- **Preserve ample recreation space**: Maintain safe access to the beach and provide mowed area(s) where people can recreate as they do now.
- **Follow Local, State, and Federal Regulations**: Obtain all the necessary permitting to perform any restoration activities advisable within the wetland borders and corresponding buffer zones.

Trail Plan

The following trail work plan will describe each section of the two trails at Squam Rock Pasture that are currently recommended for improvements. Some redundant trails were not maintained by mowing in 2023 and are recommended to be abandoned. All of the proposed work is to be done with volunteers using hand tools.

The work includes several terms that may not be familiar and are explained here.

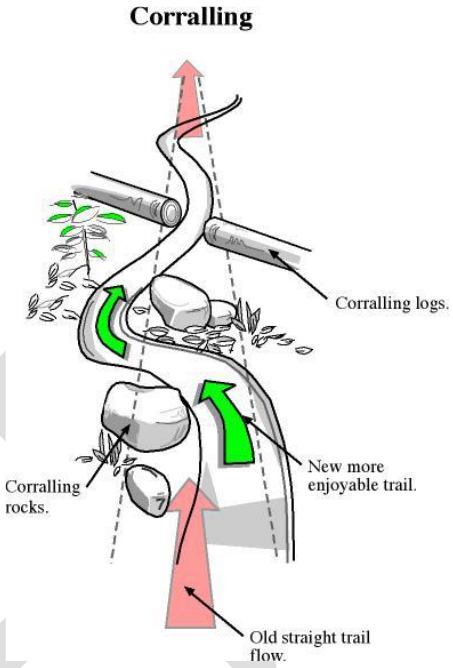
Fall Line Trail



A Fall Line Trail is parallel to the direction of the maximum slope and if it is too steep will cause erosion.

Corralling

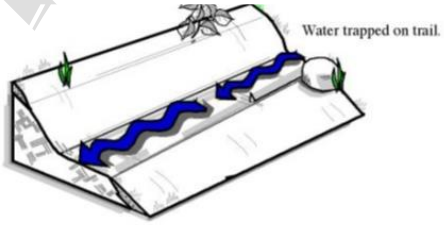
Using “trail anchors” (stones, shrubs, logs, or other obstacles) to redirect and keep users on the trail and prevent spread. Make sure the narrowing flows naturally with the trail. Otherwise, users could find it annoying and may create a new route around it.

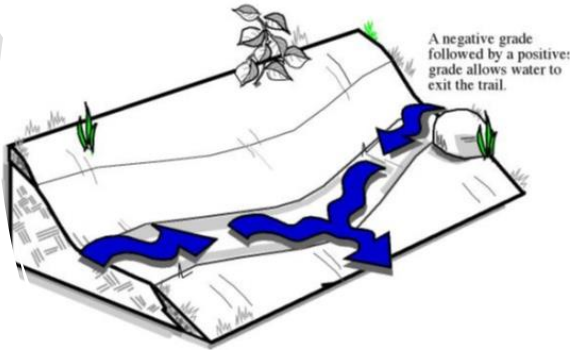


Grade Reversals

Note that grade reversals can be so subtle as to not be noticed. A dip of an inch or two can redirect water off the trail.

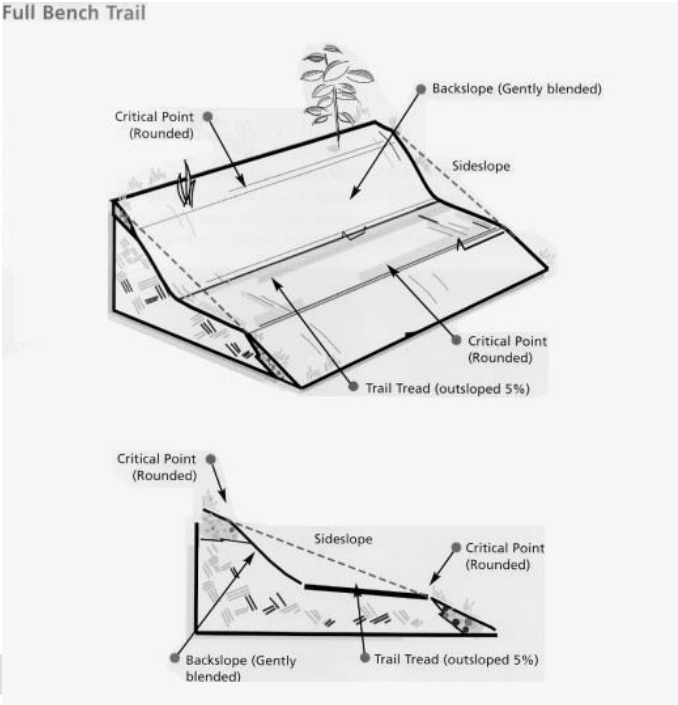
They are recommended on a trail every 20 to 50 ft.





Bench Cut

Note that the edge of the trail indicated as “critical point” is where one wants to prevent the build-up of a berm.



Slough and Berms

On hillside trails, ***slough*** (pronounced ***sluff***) is soil, rock, and debris that has moved downhill to the inside of the tread, narrowing the tread. Slough needs to be removed (figure 30). Doing so is hard work. Slough that doesn't get removed is the main reason trails "creep" downhill.

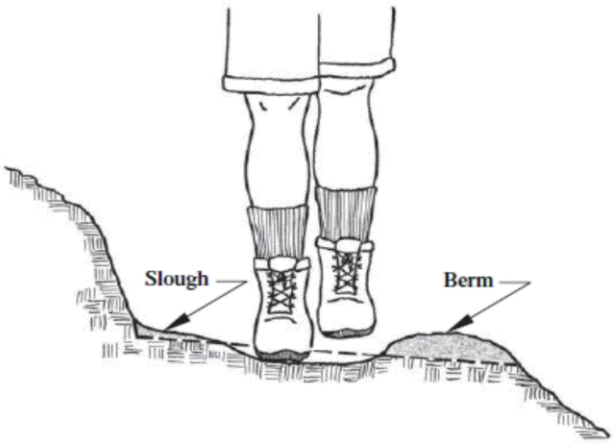
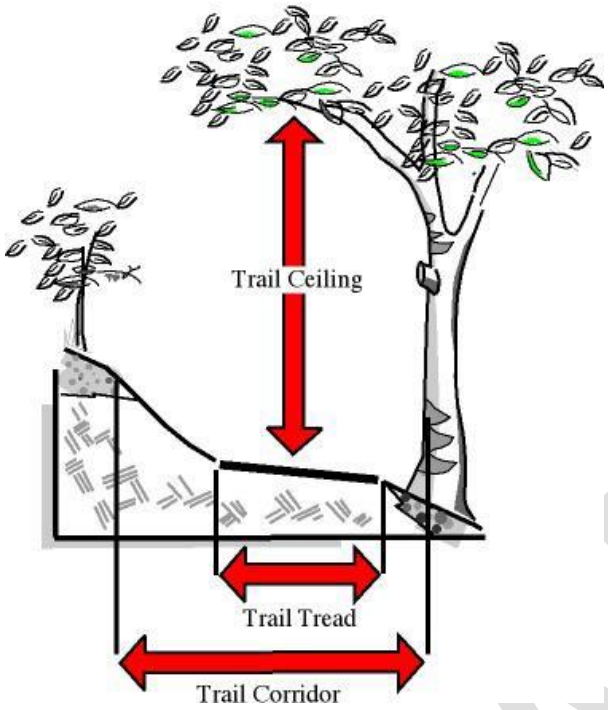


Diagram Showing Slough and Berm

Regular maintenance needs to focus on removing slough (material that has fallen into the trial from above) and berm to prevent water from flowing in trail depression created by compaction.

Trail Corridor



Main Trail

The Main Trail leads from the entrance on Walnut Street down to the entrance to the beach. It is 1,090 feet long. Several sections are located on the fall line (parallel to the direction of maximum slope) and have erosion problems. Past efforts to deal with these problems have included the installation of wooden "water bars" or stairs that have caused widening of the trail when visitors walk around them.

In the summer of 2023 one major section of this trail in an unregulated area was successfully relocated to avoid steep sections by mowing a new longer route and blocking off the old trail.

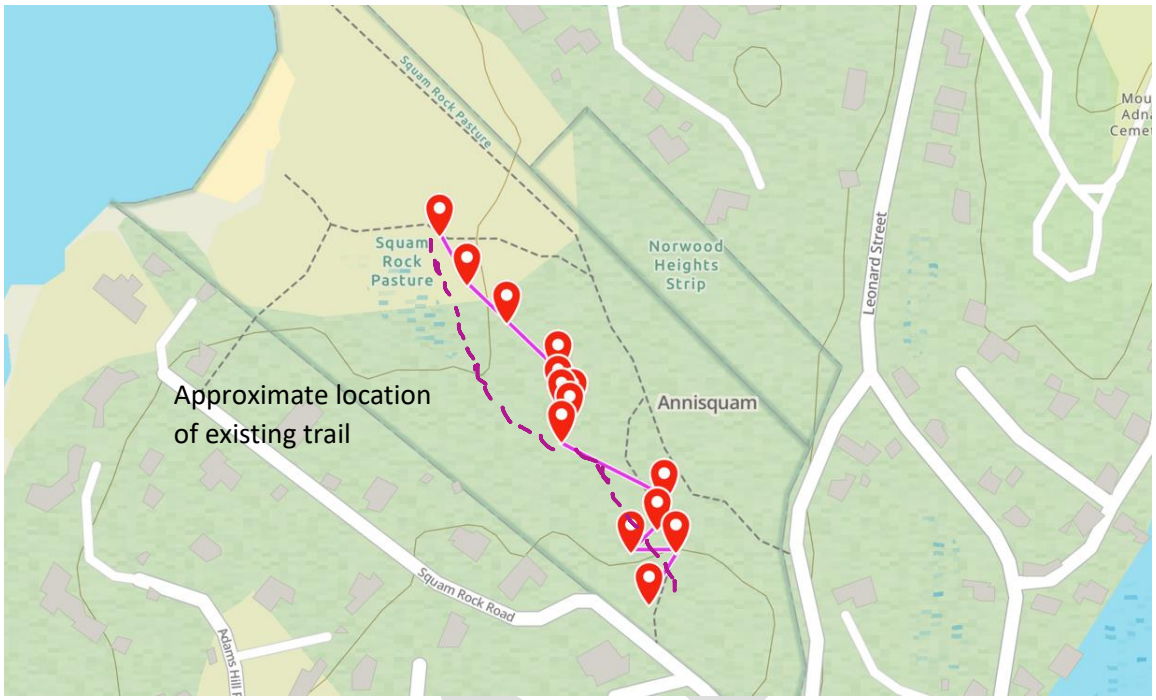
Trail Segment	**Main Trail**	
Length	1,090 feet	
Distance	**Reference Point**	**Work Needed/Comments**
0'	Entrance at Walnut Street – beginning of paved path	Consider removing paved path and relocating a new route that could be natural surface at some point in the future.
238'	End of paved path (Waypoint 42.65811, -70.67741)	
293'	Intersection on left with trail from Squam Rock (Waypoint 42.65815, -70.67748)	Consider curving and adding "trail anchors" to better define trail. "Corralling"
353'	First water bar (Waypoint 42.65840, -70.67760)	Consider curving and adding "trail anchors" (stones, logs, shrubs, or other obstacles) to better define trail. Add "grade reversals" where possible.
414'	Intersection with obscure trail to Woodland (Waypoint 42.65855, -70.67766)	Consider curving and adding "trail anchors" (stones, logs, or other obstacles) to better define trail. Add "grade reversals" where possible.
508'	Trail splits around patch of juniper (Waypoint 42.65878, -70.67783)	Consider curving and adding "trail anchors" (stones, logs, or other obstacles) to better define trail. Add "grade reversals" where possible.
592'	Intersection with trail to right and granite bench (Waypoint 42.65901, -70.67799)	Consider curving and adding "trail anchors" (stones, logs, or other obstacles) to better define trail. Add "grade reversals" where possible.
663'	Beginning of series of wooden water bars	This section was relocated in the summer of 2023
719'	End of series of water bars	Part of section that was relocated in 2023.
765'	Beginning of another series of wooden water bars	Part of section that was relocated in 2023
835'	End of series of water bars. Intersection with trail from woodland.	Part of section that was relocated in 2023
865'	Trail splits with both going to beach. (Waypoint 42.65921, -70.67904)	Eliminate redundant trail

Distance	Reference Point	Work Needed/Comments
1,000’	Intersection with trail to left (Waypoint 42.65926, -70.67957)	Consider curving and adding “trail anchors” (stones, logs, or other obstacles) to better define trail. Add “grade reversals” where possible.
1,090’	Stairs to beach (waypoint 42.65937, -70.67971)	

Squam Rock Trail along NE side of Wooded Swamp (green on map)

Much of this trail is very close to the Wooded Swamp and is in the regulated “buffer zone.” It is recommended that the entire length be relocated away from the swale along the Wooded Swamp. The following table is keyed to waypoints along the relocated trail. Note that distances and waypoints are approximate and may be moved slightly during trail construction.

Trail Segment	Squam Rock Trail (Along NE side of Wooded Swamp)	
Length	855 feet	
Distance	**Reference Point**	**Work Needed/Comments**
0’	Intersection with Main Trail heading toward Squam Rock (Waypoint 42.65915, -70.67888)	
85’	Relocation flag upslope from existing trail (Waypoint 42.65894, -70.67870)	Relocate upslope (away from Wooded Swamp). Mow or clear trail corridor to create new route -Bench cut where necessary to create comfortable trail bed. Include grade reversals.
175’	Relocation flag upslope from existing trail (Waypoint 42.65876, -70.67845)	Relocate upslope (away from Wooded Swamp). Mow or clear trail corridor to create new route -Bench cut where necessary to create comfortable trail bed. Include grade reversals.
285’	Relocation flag upslope from existing trail (Waypoint 42.65854, -70.67817)	Relocate upslope (away from Wooded Swamp). Mow or clear trail corridor to create new route -Bench cut where necessary to create comfortable trail bed. Include grade reversals.
325’	Relocation flag upslope from existing trail (Waypoint 42.65845, -70.67815)	Relocate upslope (away from Wooded Swamp). Mow or clear trail corridor to create new route -Bench cut where necessary to create comfortable trail bed. Include grade reversals.
365’	Relocation flag upslope from existing trail (Waypoint 42.65838, -70.67814)	Relocate upslope (away from Wooded Swamp). Mow or clear trail corridor to create new route -Bench cut where necessary to create comfortable trail bed. Include grade reversals.
395’	Relocation flag upslope from existing trail (Waypoint 42.65838, -70.67807)	Relocate upslope (away from Wooded Swamp). Mow or clear trail corridor to create new route -Bench cut where necessary to create comfortable trail bed. Include grade reversals.

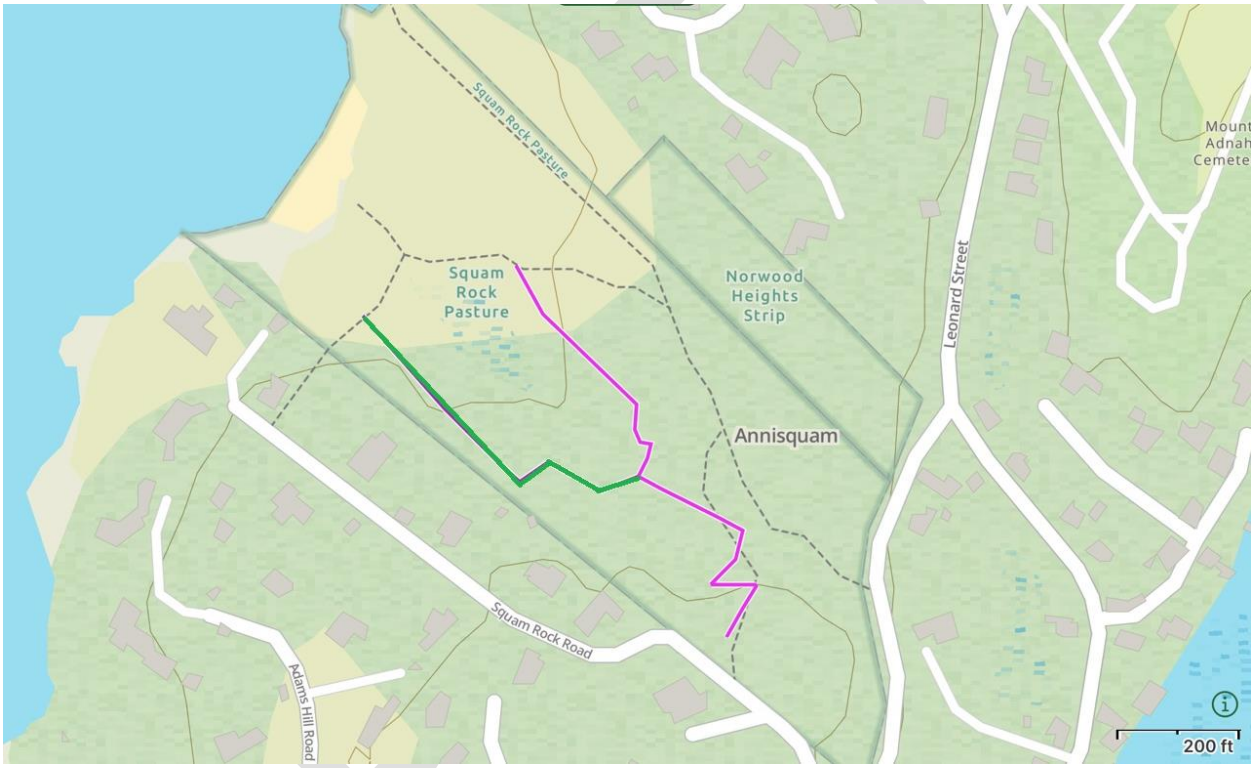


Distance	Reference Point	Work Needed/Comments
420’	Relocation flag upslope from existing trail (Waypoint 42.65831, -70.67808)	Relocate upslope (away from Wooded Swamp). Mow or clear trail corridor to create new route -Bench cut where necessary to create comfortable trail bed. Include grade reversals.
455’	Relocation flag (Waypoint 42.65822, -70.67814)	Relocate (away from Wooded Swamp). Mow or clear trail corridor to create new route -Bench cut where necessary to create comfortable trail bed. Include grade reversals.
575’	Relocation flag (Waypoint 42.65798, -70.67752)	Relocate (away from Wooded Swamp). Mow or clear trail corridor to create new route -Bench cut where necessary to create comfortable trail bed. Include grade reversals.
625’	Relocation flag (Waypoint 42.65785, -70.67756)	Relocate (away from Wooded Swamp). Mow or clear trail corridor to create new route -Bench cut where necessary to create comfortable trail bed. Include grade reversals.
705’	Relocation flag (Waypoint 42.65773, -70.67772)	Relocate (away from Wooded Swamp). Mow or clear trail corridor to create new route -Bench cut where necessary to create comfortable trail bed. Include grade reversals.
775’	Relocation flag (Waypoint 42.65775, -70.67744)	Relocate (away from Wooded Swamp). Mow or clear trail corridor to create new route -Bench cut where necessary to create comfortable trail bed. Include grade reversals.

Distance	Reference Point	Work Needed/Comments
795’	Relocation flag (Waypoint 42.65768, -70.67745)	Relocate (away from Wooded Swamp). Mow or clear trail corridor to create new route -Bench cut where necessary to create comfortable trail bed. Include grade reversals.
855’	Relocation flag (Waypoint 42.65751, -70.67761)	Relocate (away from Wooded Swamp). Mow or clear trail corridor to create new route -Bench cut where necessary to create comfortable trail bed. Include grade reversals.

Squam Rock Trail along south side of Wooded Swamp (purple on map)

This trail is in generally good shape and only needs a little maintenance consisting of berm removal and addition of “grade reversals” and out-slope where possible.



Appendix A – Trail Assessment

The aerial photo shows the current trails at Squam Rock Pasture.

All waypoints are from cell phone and are approximate locations. Rise and fall elevations determined from Gloucester GIS topography (1').

Trail Segment	Squam Rock Main Trail		
Length:		**Bill Giezentanner**	**12/20/2022**
Distance	**Location**	**Condition**	**Comments/Work Needed**
0’	Beginning of paved path at entrance		
238’	End of asphalt paved path (Waypoint 42.65811, -70.67741)	Asphalt paved path 3 to 4 feet wide. Some eroded edges and crumbling pavement. Rises 15+ feet (10% grade)	A longer, well-designed, relocated, more curved path could avoid pavement.
293’	Intersection on left with trail from Squam Rock (Waypoint 42.65815, -70.67748)	Natural surface some signs of pooling. Widening of trail in places to avoid wet spots. Almost level.	Consider curving and adding “trail anchors” to better define trail. “Corralling”
353’	First water bar (Waypoint 42.65840, -70.67760)	Natural surface some signs of erosion. Widening of trail in places to avoid wet spots. Almost level.	Consider curving and adding “trail anchors” (stones, logs, shrubs, or other obstacles) to better define trail. Add “grade reversals” where possible.
414’	Intersection with obscure trail to Woodland (Waypoint 42.65855, -70.67766)	Natural surface some signs of pooling. Widening of trail in places to avoid wet spots and steps created by water bars. Falls 10 feet (15% grade).	Consider curving and adding “trail anchors” (stones, logs, or other obstacles) to better define trail. Add “grade reversals” where possible.

Distance	Location	Condition	Comments/Work Needed
508’	Trail splits around patch of juniper (Waypoint 42.65878, -70.67783)	Natural surface some signs of pooling. Widening of trail in places to avoid wet spots. Falls 5 feet (5% grade)	Consider curving and adding “trail anchors” (stones, logs, or other obstacles) to better define trail. Add “grade reversals” where possible.
592’	Intersection with trail to right and granite bench (Waypoint 42.65901, -70.67799)	Natural surface some signs of pooling and erosion. Widening of trail in places to avoid wet spots. Falls 5 feet (6% grade).	Consider curving and adding “trail anchors” (stones, logs, or other obstacles) to better define trail. Add “grade reversals” where possible.
663’	Beginning of series of wooden water bars	Natural surface some signs of pooling and erosion. Widening of trail in places to avoid wet spots. Almost level.	Consider curving and adding “trail anchors” (stones, logs, or other obstacles) to better define trail. Add “grade reversals” where possible.
719’	End of series of water bars	Natural surface some signs of pooling and erosion. Widening of trail in places to avoid wet spots and to avoid steps created by water bars. In some places the trail is up to 10’ wide. Falls 5 feet (9% grade).	Consider curving and adding “trail anchors” (stones, logs, or other obstacles) to better define trail. Add “grade reversals” where possible.

Distance	Location	Condition	Comments/Work Needed
765’	Beginning of another series of wooden water bars	Natural surface some signs of pooling and erosion. Widening of trail in places to avoid wet spots and to avoid steps created by water bars. Falls 9 feet (20% grade).	Consider curving and adding “trail anchors” (stones, logs, or other obstacles) to better define trail. Add “grade reversals” where possible.
835’	End of series of water bars. Intersection with trail from woodland.	Natural surface some signs of pooling and erosion. Widening of trail in places to avoid wet spots and to avoid steps created by water bars. Falls 7 feet (10% grade).	Consider curving and adding “trail anchors” (stones, logs, or other obstacles) to better define trail. Add “grade reversals” where possible.
865’	Trail splits with both going to beach. (Waypoint 42.65921, -70.67904)	Natural surface some signs of pooling and much erosion to right. Widening of trail to avoid wet spots. Falls 3 feet (10% grade).	Consider curving and adding “trail anchors” (stones, logs, or other obstacles) to better define trail. Add “grade reversals” where possible. Eliminate redundant trail to beach.
1,000’	Intersection with trail to left (Waypoint 42.65926, -70.67957)	Natural surface some signs of pooling and erosion. Widening of trail in places to avoid wet spots. Falls 8’ (6% grade)	Consider curving and adding “trail anchors” (stones, logs, or other obstacles) to better define trail. Add “grade reversals” where possible.

Trail Segment	Squam Rock Trail along NE side of Wooded Swamp		
Length:		**Bill Giezentanner**	**1/7/2023**
Distance	**Location**	**Condition**	**Comments/Work Needed**
1.090’	Stairs to beach (waypoint 42.65937, -70.67971)	Natural surface some signs of pooling and erosion. Widening of trail in places to avoid wet spots. Some grass surfaces. Falls 10’ (11% grade)	Consider curving and adding “trail anchors” (stones, logs, or other obstacles) to better define trail. Add “grade reversals” where possible.
0’	Intersection with Main Trail heading toward Squam Rock (Waypoint 42.65915, -70.67888)		
128’	Beginning of eroded area (Waypoint 42.65884, -70.67857)	Natural grass surface in good condition. Rises 9’ (7% grade)	
222’	Large American beech tree (Waypoint 42.65866, -70.67834)	Natural grass surface much erosion. Rises 6’ (6% grade)	Improve drainage with “grade reversals”, and out-slopes toward wetland

Distance	Location	Condition	Comments/Work Needed
343	Beginning of steep area with steps (Waypoint 42.65861, -70.67824)	Too steep to be sustainable without constant repair. Eroded. Rises 15' (12% grade)	Consider relocating with curves and adding "trail anchors" (stones, logs, or other obstacles) to better define trail. Add "grade reversals" and out-slopes where possible.
388'	Beginning of steps (Waypoint 42.65836, -70.67814)	Too steep to be sustainable without constant repair. Badly eroded. Rises 12' (26% grade)	Consider relocating with curves and adding "trail anchors" (stones, logs, or other obstacles) to better define trail. Add "grade reversals" and out-slopes where possible.
412'	Intersection with trail along south side of wooded swamp (Waypoint 42.65823, -70.67809)	Too steep to be sustainable without constant repair. Badly eroded. Rises 12' (50% grade)	Consider relocating with curves and adding "trail anchors" (stones, logs, or other obstacles) to better define trail. Add "grade reversals" and out-slopes where possible.
511'	Beginning of another steep area with steps (Waypoint 42.65800, -70.67776)	Too steep to be sustainable without constant repair. Badly eroded. Rises 7' (7% grade)	Consider relocating with curves and adding "trail anchors" (stones, logs, or other obstacles) to better define trail. Add "grade reversals" and out-slopes where possible.

Distance	Location	Condition	Comments/Work Needed
629’	Intersection with other obscure trail from Squam Rock (Waypoint 42.65772, -70.67751)	Too steep to be sustainable without constant repair. Badly eroded. Rises 9’ (8% grade)	Consider relocating with curves and adding “trail anchors” (stones, logs, or other obstacles) to better define trail. Add “grade reversals” and out-slopes where possible.
786’	Gateway to Squam Rock Road	Some erosion some mowed trail on flatter area. Rises 22’ (14% grade)	Consider relocating with curves and adding “trail anchors” (stones, logs, or other obstacles) to better define trail. Add “grade reversals” and out-slopes where possible.

Trail Segment	Squam Rock Trail along south side of Wooded Swamp		
Length:		**Bill Giezentanner**	**1/7/2023**
Distance	**Location**	**Condition**	**Comments/Work Needed**
0’	Intersection with trail along south side of wooded swamp (Waypoint 42.65823, -70.67809)		
91’	Large American beech tree (Waypoint 42.65814, -70.67837)	Natural surface. Some berm buildup. Rises 10’ (6% grade)	Remove berm and add “grade reversals” and out-slope where possible.
184’	Trail crosses rock (Waypoint 42.65828, -70.67867)	Natural surface little erosion. Rises 3’ (4% grade)	Remove berm and add “grade reversals” and out-slope where possible.
231’	Trail enters field (Waypoint 42.65821, -70.67884)	Natural surface little erosion. Falls 4’ (8% grade) Maintenance shed on left. Some erosion up to shed.	Remove berm and add “grade reversals” and out-slope where possible.
372’	Tree on right with Fortune’s spindle vine (Waypoint 42.65846, -70.67925)	Natural surface little erosion. Falls 18’ (12% grade)	Remove berm and add “grade reversals” and out-slope where possible.

Distance	Location	Condition	Comments/Work Needed
591’	Intersection with trail from neighborhood (Waypoint 42.65889, -70.67986	Mowed grass trail. Good condition. Falls 10’ (5% grade)	

Trail Segment	Squam Rock Trail from neighbor entrance through stone wall		
Length:		**Bill Giezentanner**	**1/7/2023**
Distance	**Location**	**Condition**	**Comments/Work Needed**
0’	Squam Rock Road		
150’	Entrance from neighborhood	Erosion down from stone entrance to left. Water channeled between stone walls spills onto trail. Falls 12’ (8% grade)	?
228’	Trail intersection to right. (Waypoint 42.65889, -70.67986)	Mowed grass trail, some erosion caused by drainage between stone walls. Falls 6’ (9% grade)	Add “grade reversals” and out-slope where possible to prevent water from flowing in trail
300’	Beginning of badly eroded area (Waypoint 42.65905, -70.67967)	Mowed grass trail some erosion, Falls 8’ (11% grade)	Add “grade reversals” and out-slope where possible to prevent water from flowing in trail
388’	Intersection with Main Trail (Waypoint 42.65926, -70.67957)	Section of badly eroded trail. Falls 5’ (6% grade)	Add “grade reversals” and out-slope where possible to prevent water from flowing in trail

Trail Segment	Squam Rock Trail to lighthouse along north boundary stone wall		
Length:		**Bill Giezentanner**	**1/7/2023**
Distance	**Location**	**Condition**	**Comments/Work Needed**
0’	Boundary		
200’	Break in stone wall and trail to left adjoining property (Waypoint 42.66013, -70.67931)	Natural surface some on ledge, some on mowed grass. Area flooded with fresh water flowing from uphill. Rise 5’ (2.5% grade)	?
422’	Trail along stone wall	Natural surface on mowed grass. Area flooded with fresh water flowing from uphill. Rise 20’ (9% grade – some areas steeper)	? Seasonally closed? Boardwalk?
555’	Intersection with mowed trail to right into field (Waypoint 42.65939, -70.67856)	Natural surface on mowed grass. Rise 6’ (5% grade)	? Seasonally closed?
752’	Intersection with Main Trail at granite bench (Waypoint 42.65901, -70.67799	Natural surface on mowed grass. Rise 22’ (11% grade)	? Seasonally closed?

Appendix B – DeRosa Environmental Wetland Delineation